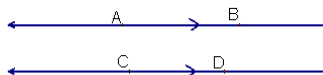
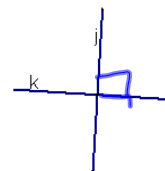
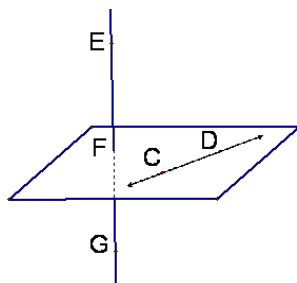


204 Notes 3.1 and 3.2

**3.1 Relationships between Lines**Parallel lines—two lines are parallel if they are coplanar and do not intersect. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ 

This means  
the lines are parallel

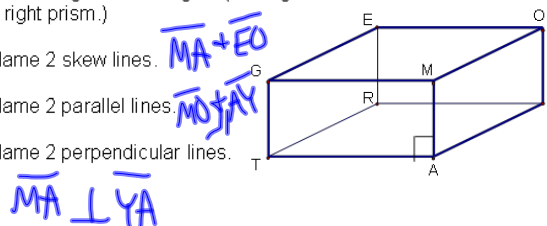
Perpendicular lines—two lines are perpendicular if they intersect to form a right angle. $j \perp k$ Skew lines—two lines are skew if they are **not** coplanar and they do **not** intersect. $\overleftrightarrow{CD}$  and  $\overleftrightarrow{FG}$  are skew

Use the figure to the right. (The figure is a right prism.)

Name 2 skew lines.

Name 2 parallel lines.

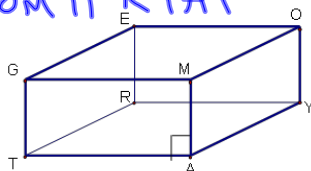
Name 2 perpendicular lines.



Parallel planes—planes that do not intersect.

Name 2 parallel planes from the picture on the previous page.

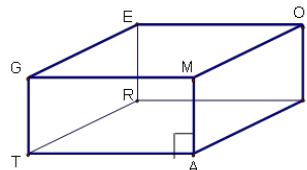
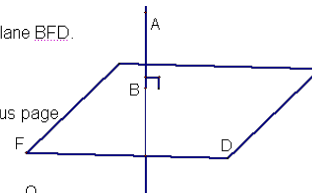
GEOM || RTAY



A line can be perpendicular to a plane.

In the figure to the right,  $AB \perp$  plane BFD.

Name a plane and line that are  $\perp$  from the picture on the previous page



### 3.2 Theorems about Perpendicular Lines

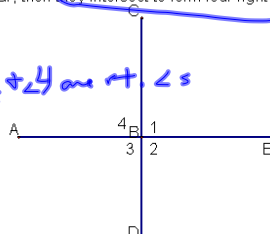
Theorem 3.1—All right angles are congruent.

Theorem 3.2—If two lines are perpendicular, then they intersect to form four right angles.

Given:  $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$

Conclusions:  $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$  are rt.  $\angle$ s

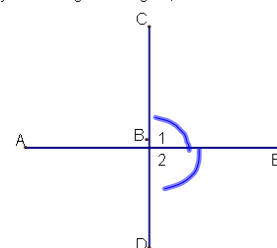
$\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$



Theorem 3.3—If two lines intersect to form adjacent congruent angles, then the lines are perpendicular.

Given:  $\angle 1 \cong \angle 2$

Conclusion:  $\overleftrightarrow{AE} \perp \overleftrightarrow{CD}$

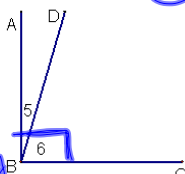


Theorem 3.4—If two sides of adjacent acute angles are perpendicular, then the angle are complementary.

Given:  $\overrightarrow{AB} \perp \overrightarrow{BC}$

Conclusion:  $\angle 5 + \angle 6$

are complementary



#### EXAMPLES:

Match the statements with the appropriate justification.

1.  $\angle 9$  and  $\angle 10$  are complementary

2.  $\angle 1$  and  $\angle 2$  are right angles

3.  $\angle 1 \cong \angle 2$

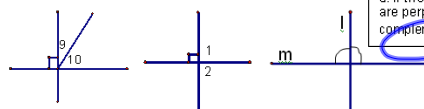
4.  $l \perp m$

a. All right angles are congruent.

b. If two lines are perpendicular, then they intersect to form four right angles.

c. If two lines intersect to form adjacent congruent angles, then the lines are perpendicular.

d. If two sides of adjacent acute angles are perpendicular, then the angles are complementary.



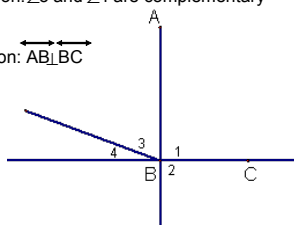
Use the picture to the right, match the conclusions to the theorems.

5. b Given:  $\overrightarrow{AB} \perp \overrightarrow{BC}$ ; Conclusion:  $\angle 1$  and  $\angle 2$  are right angles

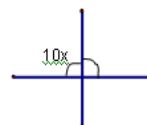
6. a Given:  $\overrightarrow{AB} \perp \overrightarrow{BC}$ ; Conclusion:  $\angle 1 \cong \angle 2$

7. d Given:  $\overrightarrow{AB} \perp \overrightarrow{BC}$ ; Conclusion:  $\angle 3$  and  $\angle 4$  are complementary

8. c Given:  $\angle 1 \cong \angle 2$ ; Conclusion:  $\overrightarrow{AB} \perp \overrightarrow{BC}$



9a.  $x = 9$   
 $10x = 90$



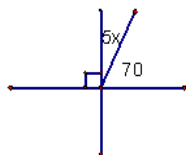
9b.

$$x = 4$$

$$5x + 70 = 90$$

$$5x = 20$$

$$x = 4$$



10a.

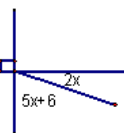
$$x = 12$$

$$2x + 5x + 6 = 90$$

$$7x + 6 = 90$$

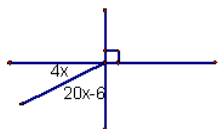
$$7x = 84$$

$$x = 12$$

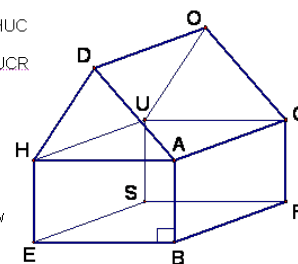


10b.

$$x = 4$$



True or False

11. F  $\vec{HA}$  and  $\vec{AC}$  are skew12. T plane SEB  $\parallel$  plane HUC13. F plane ACR  $\parallel$  plane UCR14. F  $\vec{DH} \parallel \vec{DA}$ 15. T  $\vec{AB} \perp \vec{BR}$ 16. T  $\vec{EB} \perp$  plane ACR17. T  $\vec{EB}$  and  $\vec{CR}$  are skew18. T  $\vec{HE} \parallel \vec{CR}$ 19. T  $\vec{HA} \parallel \vec{EB}$ 20. T  $\vec{US} \perp \vec{UC}$ 

Homework

p110-111    #s 9-19, 21-24

p117-118    #s 12-14, 17-24